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VIRTUAL PRODUCT EXPERIENCE: THE EFFECTS OF INTERACTIVITY AND TASK ON PRESENCE PERCEPTIONS

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Abstract

Presence perceptions (i.e., perceptions of nonmediation in technology-mediated environments, Lombard & Ditton, 1997) have been demonstrated to influence consumers' attitudes and intentions in online shopping situations; the factors leading to presence, however, are not well understood. In business-to-consumer e-commerce environments, factors such as task characteristics (i.e., searching versus browsing), object interactivity, and users' characteristics can influence presence perceptions. A model is presented that demonstrates how a consumer's task as well as the interactivity of virtual product representations can influence the consumer's sense of presence, and, subsequently, beliefs about the product and the web site. In order to test the theoretical model, a laboratory experiment has been designed. The expected findings will further the understanding of factors influencing presence perceptions and online buying behavior, and will thus provide prescriptive insights for the design of business-to-consumer e-commerce systems.

Keywords: Presence, virtual product representations, interactivity, electronic commerce.

1 INTRODUCTION

Unlike traditional retailers, online merchants often face the problem of not being able to represent certain product features and attributes (Lal & Sarvary 1999); consequently, due to the mediated environment, online consumers lack the ability to directly experience a product. However, online businesses have the opportunity to provide a virtual product experience (Jiang & Benbasat 2004-2005), so that consumers are able to virtually interact with products prior to purchase (Klein 1998). Although research has demonstrated that indirect product experiences are less powerful than direct experiences (Fazio & Zanna 1981), virtual product experiences can mimic some aspects of direct experiences and can thus influence a consumer's attitudes and intentions. Prior research (e.g., Li, Daugherty, & Biocca 2002), has demonstrated that presence – i.e., the “illusion of nonmediation” (Lombard & Ditton 1997, Presence Explicated section, ¶1) – can influence a consumer's attitudes and intentions. The factors contributing to a consumer's sense of presence, however, have not been thoroughly researched. Although researchers have studied the effects the medium (e.g., interactivity or vividness) and characteristics of the user (e.g., computer self-efficacy, mood, etc.) on a sense of presence within a virtual product environment, other factors, such as the effects of the task (e.g., goal-directed vs. experiential, or, searching for specific information vs. browsing for entertainment) have received only limited attention. Therefore, this study will attempt to fill this gap and address the following overarching research question: *How do characteristics of task and medium influence a consumer's sense of presence in online shopping environments?*

Thus, this study will help to further the understanding of user reactions to virtual product experiences as technological capabilities increase. Given that task objectives can be extended into other contexts, this research will contribute to the understanding of user responses in mediated environments in general.

This research will also have some important implications for practice, as it will help designers of online shopping environments to determine the conditions under which certain features will enhance presence. As there is often a considerable cost to adding sophisticated features such as interactivity (Lim & Benbasat 2000), a better understanding of the factors influencing presence can help designers to more deliberately choose when to employ various features.

In the following sections, the relevant literature will be discussed. Next, the theoretical basis and the hypotheses will be presented, followed by a brief description of the research design. Finally a conclusion and directions for future research will be provided.

2 LITERATURE REVIEW

2.1 Definitions of Presence

The concept of presence has played a major role in studies examining users' affective and cognitive responses when interacting with virtual environments, especially in the field of virtual reality (e.g., Steuer 1992). In this context, scholars have conceptualized presence in a number of different ways. Steuer, for example, defined presence as “the sense of being in an environment” (p. 75, see also Biocca 1992). Many researchers have since defined presence in similar ways. What is common among many definitions is the concept of “being there” (Slater 1999). In order to arrive at a unified definition of presence, Lombard and Ditton (Lombard et al. 1997) thoroughly reviewed past presence research and defined presence as the “perceptual illusion of nonmediation” (e.g., Presence Explicated section, ¶1, see also IJsselsteijn & Riva 2003, Riva 2003). Arguably, while an illusion of nonmediation can be created using sophisticated virtual reality systems, it is unlikely that visitors of an online retailer's web site fail to perceive the technology mediating the experience. Thus, Lombard's (2001) explication of presence appears more appropriate in the context of this study:

Presence (a shortened version of the term "telepresence") is a psychological state or subjective perception in which even though part or all of an individual's current experience is generated by and/or filtered through human-made technology, part or all of the individual's perception fails to accurately acknowledge the role of the technology in the experience. Except in the most extreme cases, the individual can indicate correctly that s/he is using the technology, but at *some* level and to *some* degree, her/his perceptions overlook that knowledge and objects, events, entities, and environments are perceived as if the technology was not involved in the experience (emphasis in the original).

While researchers have defined several general dimensions of presence, the dimensions spatial presence ("it seemed as if I was someplace else", Lombard & Snyder-Duch 2001), engagement ("it was so involving", *ibid*), presence as perceptual realism ("it seemed so real", *ibid*), and presence as social realism ("it seemed so realistic", *ibid*) seem to be most relevant in this context. When virtually interacting with an object, a user may perceive that he/she is immediately interacting with the mediated environment (spatial presence), be highly involved, and perceive that the objects in the mediated environment look, sound, and feel as if they were real (perceptual realism) or could exist in the real world (social realism)(Lombard & Snyder-Duch 2001). The last dimension, social presence, concerns communication with persons or entities in a shared space, and is thus less relevant for the context of this study.

2.2 Antecedents of Presence

In addition to discussions about the definitions of presence, scholars have debated about its antecedents. Although it has been proposed that a sense of presence can arise during interaction with different forms of media, such as television, cinema, or even books (e.g., Davide & Walker 2003, Kim & Biocca 1997), many scholars agree that current information technologies offer the greatest potential in this regard (Biocca 1997, Biocca & Levy 1995, Steuer 1992). Several researchers have proposed a variety of factors contributing to presence. Sheridan (1992) suggested that an individual's ability to modify the virtual environment would influence presence. Relatedly, Steuer (1992) proposed several media characteristics believed to influence presence; two factors closely associated with the medium are vividness and interactivity. Whereas vividness is influenced by the medium's breadth (i.e., the quantity of sensory channels employed) and depth (i.e., the bandwidth available), the medium's interactivity is determined by the user's ability to modify and interact with the virtual environment. As there can be different ways to allow modifying the virtual environment, interactivity can vary in degree and type (Lombard & Snyder-Duch 2001). This conceptualization has also been used by Jiang and Benbasat (2004-2005), who argue that direct manipulation can be used to achieve differing levels of interactivity.

Other factors influencing presence are characteristics associated with the user, the content, and the task (IJsselsteijn, de Ridder, Freeman, & Avons 2000). Researchers in the area of human-computer interaction (e.g., Jiang & Benbasat 2003) and electronic commerce (e.g., Wells, Fuerst, & Palmer 2005) noted that different interfaces might be more suited for different tasks. Even though some researchers have studied the influence of task characteristics (such as task importance, Petersen & Bente 2001) on presence, there is still a void of research in this area (Lombard et al. 1997); especially the effects of interface design for experiential tasks (as are often found in online shopping situations) have only recently received attention (Wells et al. 2005).

Scholars in Marketing (Hoffman & Novak 1996) and Information Systems (Wells et al. 2005) have differentiated two broad categories of tasks, namely, experiential and goal-directed tasks. In an online shopping situation, searching (Schlosser 2003) can be considered a goal-directed task, as it is characterized by an instrumental, task specific nature. In contrast, browsing can be considered an experiential task, as it is characterized by an aesthetic stance, focusing on experiential values (Schlosser 2003). For different tasks, different levels of interactivity should influence presence differentially due to the congruence between the desired and actual information presentation (see Goodhue 1995, 1998, Vessey 1991).

2.3 Outcomes of Presence

In addition to factors contributing to presence, many potential outcomes of presence are still unclear; however, there is evidence that a sense of presence may influence consumer reactions. For example, Grigorovici (2003) hypothesized that mediated experiences can have a substantial influence on persuasion; this hypothesis was supported by Kim and Biocca (1997), who found a positive effect of presence on persuasion. Similarly, Li, Daugherty, and Biocca (2002) found support for the mediating role of presence in the relationship between 3-D advertising, product knowledge, and brand attitude.

3 THEORETICAL DEVELOPMENT AND HYPOTHESES

To date, only very few researchers have attempted to theorize about presence (the most notable exceptions being Lombard & Ditton 1997, Witmer & Singer 1998). This study will test a theoretical framework of presence, which is partly based on Nicholson's (2005) dissertation work, in that, similar to IJsselsteijn et al. (2000), presence is conceptualized as being determined by factors related to the user, the medium, and the task; the focus of this study will be on the latter two factors (see Figure 1). The experience of presence in turn has, as an outcome, a strong influence on beliefs, attitudes and intentions (Nicholson 2005, see also Ajzen & Fishbein 1980 for a discussion of the beliefs-attitude-behavior links).

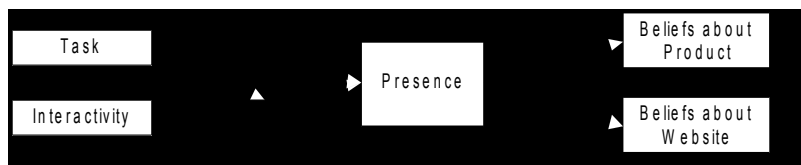


Figure 1 - Operational Model

With regard to characteristics of the medium, this study will build on Steuer's (1992) conceptualization of the factors leading to presence. Specifically, the proposed study will manipulate the interactivity of a virtually represented product. According to Steuer, interactivity is determined by speed, range, and mapping. *Speed* refers to the response time and the possibility for real-time interaction with a system; *range* refers to the number of ways in which attributes can be manipulated; *mapping* refers to "the ability of a system to map its controls to changes in the mediated environment in a natural and predictable manner" (Steuer 1992, p. 86). Obviously, maximizing all three of these factors in virtual environments comes at a cost due to the increased complexity of the system. Whereas speed is to a large extent determined by the user's technological environment, designers of virtual environments have considerable latitude in manipulating range and mapping¹.

A higher degree of interactivity will let users feel more "in control"; thus, the consumer experiences similar feelings to what s/he experiences when interacting with a real object (see also Klein 2003). The increase in interactivity can make a target object look and feel more like the way it would or could look and feel in the real world; this also contributes to feelings of immediate interaction with the object. Users interacting with a virtual product display high in interactivity should therefore experience higher degrees of presence.

H1: Increased interactivity will lead to increased presence.

Another potentially important aspect influencing a consumer's sense of presence in a virtual product experience is the consumer's task, which can be experiential (i.e., browsing) or goal-directed (i.e., searching)(Wells et al. 2005). Consumers performing a search task are primarily focused on extracting information from a website and take an analytic approach to interacting with the site (Hoffman et al. 1996, van der Heijden 2004, Wells et al. 2005). In contrast, when performing a browse task,

¹As discussed above, both interactivity and vividness have an effect on a consumer's experience of presence; however, the proposed study will focus only on interactivity.

consumers focus on entertainment (Schlosser 2003). In other words, consumers that are browsing will take a less analytic approach and will therefore be more likely to suspend disbeliefs while being entertained. In other words, the target object will look and feel more “real”. This increased likelihood to suspend disbeliefs should lead to an increased sense of presence (Draper, Kaber, & Usher 1998, Steuer 1992).

H2: The consumer’s task will influence presence, such that consumers engaged in browsing will experience higher levels of presence than consumers engaged in searching.

Kempf (1999) suggested that the representation of experiential aspects can be enhanced by increasing interactivity, leading to a better fit between the way a product is presented and the information presentation needed to derive fun and enjoyment (Vessey 1991). Under conditions of low interactivity, however, consumers will not have the features available to experience a high sense of presence. Thus, under such conditions, consumers should feel a lower sense of presence, as there is a poor fit between the desired and actual information presentation.

H3: Task and interactivity will interact to influence presence such that when browsing a site containing a product display high in interactivity, presence will be highest.

Factors related to the individual users (such as mood, computer self-efficacy, or playfulness) are also expected to influence presence; however, these are not the focus of the proposed study. Nevertheless, all will be measured and statistically controlled within the hypothesis testing.

Researchers in the area of social psychology and consumer behavior have theorized about the effects of advertising as compared to direct product experience. Fazio and Zanna (1981) argued that direct experience would lead to stronger held beliefs about an object. According to Smith and Swinyard, (1988), a person trying out a product herself is more likely to believe her own experience than an advertising claim due to higher levels of source credibility. Klein (van der Heijden 2003) conceptualized a virtual experience as being closer to the real experience than advertising is to a real experience. Thus, perceptions of reality are seen as lying on a continuum (Grigorovici 2003), such that the stronger the illusion of reality, the stronger the effects on beliefs (in other words, a strong sense of presence can simulate a direct-like experience). When interacting with an online retailer, consumers usually form beliefs about product and towards the web site. As the sense of presence is not targeted specifically at the web site or the product, the following is hypothesized:

H4a: Presence will positively affect beliefs about the product.

H4b: Presence will positively affect beliefs about the web site.

Ajzen and Fishbein’s (1980) theory of reasoned action has been widely used in the social sciences. According to this expectancy-value model, a person’s attitude toward an object is determined by the weighted sum of the person’s salient beliefs about the attitude object. Thus, there is a positive relationship between the salient beliefs about the attitude object and the attitude towards an object. As the Beliefs-Attitudes-Intentions relationships have received ample support in the literature, and to avoid “errors of inclusion” (Benbasat & Zmud 2003), no further relationships are hypothesized in this study.

4 RESEARCH DESIGN

The proposed study will employ a laboratory experiment using student subjects to test the effects of task and media characteristics on presence. Specifically, the proposed study will employ a 2 x 2 full factorial design, manipulating task (search/browse) and interactivity (high/low); vividness will be held constant across conditions.

The participants, students enrolled in an introductory management information systems course, will be randomly assigned to the different conditions. As the course is mandatory for all business students, the potential confound of using only MIS students (who might be used to sophisticated interfaces, and might thus be less sensitive to the experimental manipulation) is reduced. The students are primarily young adults, which is a population segment heavily using online shopping (Hoffman, Novak, &

Venkatesh 2004). Thus, as the proposed study is conducted in the context of online shopping, the sample is appropriate for the experiment. Using a laboratory experiment will help to increase precision and control (Calder, Phillips, & Tybout 1982, McGrath 1982).

Procedure

The study will be conducted in separate sessions in a controlled computer laboratory. The number of subjects participating in each session will depend on the facilities used for the study. At the beginning of each session, the subjects will be instructed to complete an electronic consent form. Then, the subjects will be redirected to a page containing a brief scenario to set the stage for the experiment and the task manipulation (search vs. browse). Following this manipulation, the subjects will be redirected to a web page of a fictitious online retailer; depending on the condition, this page will present the target product (a digital camera) with different levels of interactivity.

Interactivity will be manipulated by providing one of two different sites; in the high-interactivity condition, the subjects can interact with the virtual target product by using their mouse pointer to operate the product's different menu functions. The subjects in the low interactivity conditions will be provided with the same information on the same page, but will see the menu choices in form of separate tables.

Shopping task (browse vs. search) will be manipulated following Schlosser's (2003) experiment where subjects in the browse condition will be asked to "have fun, looking at whatever you consider interesting and/or entertaining." (p. 188); subjects in the search condition will be asked to interact with the site with "the task of efficiently finding something specific within the site" (p. 188).

After a period of time of (virtually) interacting with the product, the subjects will be redirected to a web page containing measures of product perceptions, presence, mood, beliefs, attitudes, and intentions. Manipulation checks will be employed to ensure that the task and interactivity manipulations had the desired effects. The subjects will then be debriefed, thanked, and dismissed.

Measures

All measures will be pretested and validated prior to the actual study. Measures of potential covariates (such as mood, computer self-efficacy, playfulness, or domain familiarity) will be assessed during a separate session.

Measures of presence: Many researchers have attempted to arrive at measures of presence. Broadly, these measures can be categorized as objective or subjective (IJsselstein et al. 2003). For the proposed study, however, only self-ratings (i.e., subjective measures) will be used. Specifically, the subjects will be asked to complete measures focusing on spatial presence and perceptual realism. These measures will be adapted from Lessiter et al. (2001) and Lombard et al. (2000).

Measures of beliefs: Measures for salient beliefs about the target objects will be developed during the pretest phase following the free elicitation method recommended by Ajzen and Fishbein (1980).

Data Analyses

The hypotheses will be tested using ANOVA. Further, the overall model fit will be tested using Structural Regression Modeling (EQS).

5 CONCLUSION

This study will help to further clarify factors leading to increased presence during a consumer's interaction with virtual product displays. The study will focus on users' perceptions of interactivity depending on the task at hand; future studies could use different products (e.g., varying on the hedonic/utilitarian dimensions) and/or subjects. Further, the study will manipulate several elements of interactivity simultaneously in order to strengthen the experimental manipulation; future research could attempt to tease out the differential effects of these features in order to help designers of virtual

product displays choose which specific features to employ in order to increase a user's sense of presence, depending on the desired effect.

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